

CLAIMS

What is claimed is:

1. A heat exchanger comprising:
5 a plurality of first tubes in which a
first fluid circulates;
10 first fins for facilitating heat exchange,
the first fins being arranged between the first tubes;
15 a plurality of second tubes in which a
second fluid circulates;
20 second fins for facilitating heat
exchange, the second fins being arranged between the
second tubes;
25 header tanks communicating with both the
tubes, the header tanks being arranged at both
longitudinal end sides of both the tubes;
30 at least two pieces of separators for
dividing a space in the header tank into a first space
communicating with the first tubes and a second space
communicating with the second tubes, the two pieces of
35 separators composing a third space between the first
space and the second space;
40 at least two pieces of third tubes for
connecting a portion corresponding to the third space of
the header tank on one longitudinal end side of both the
tubes with a portion corresponding to the third space of
the header tank on the other longitudinal end side; and
45 fin arranged between the third tubes,
wherein
50 the size of the first tubes and the second
tubes is the same as that of the third tubes, and the
size of the first fins and the second fins is the same as
that of the fin arranged between the third tubes.
55 2. A heat exchanger according to claim 1, wherein
a hole for communicating the third space with the outside
60 of the header tank is formed in the third space
corresponding portion of the header tank corresponding to
the third space.

3. A heat exchanger according to claim 2, wherein both the tubes are provided extending in the vertical direction, and the hole is provided in the header tank on the lower side.

5 4. A heat exchanger according to claim 1, wherein
the temperature of the first fluid is higher than that of
the second fluid.

5. A heat exchanger according to claim 1, wherein the engine coolant flows in the first tubes and the electric system coolant for cooling an electric motor and a control circuit for the motor flows in the second tubes.

6. A heat exchanger according to claim 1, wherein
the header tank includes a core plate into which the
longitudinal end portions of the first tubes, the second
tubes and the third tubes are inserted and a tank body
for defining the space in the header tank together with
the core plate, and wherein the tubes, the fins and the
core plate are made of aluminum and the tank body is made
of resin.

7. A heat exchanger according to claim 1, wherein the header tank includes a core plate into which the longitudinal end portions of the first tubes, the second tubes and the third tubes are inserted and a tank body for defining the space in the header tank together with the core plate, and wherein the tubes, the fins, the core plate, the tank body and the separator are made of aluminum.

30 8. A heat exchanger according to claim 7, wherein
the core plate and the separator are joined to each other
by means of brazing.

with both the tubes, the header tanks being arranged at both longitudinal end sides of both the tubes; and

5 two pieces of separators made of metal for
dividing a space in the header tank into a first space
communicating with the first tubes and a second space
communicating with the second tubes, the two pieces of
separators composing a third space between the first
space and the second space; wherein

the two pieces of separators are joined by
10 brazing to the header tank under the condition that the
two pieces of separators are inserted from the slit hole
formed in the header tank into the header tank, and a
hole for communicating the third space with the outside
of the header tank is formed in the third space
15 corresponding portion corresponding to the third space in
the head tank.

10. A method of manufacturing a heat exchanger,
the heat exchanger comprising: a plurality
20 of first tubes made of metal in which a first fluid
circulates; a plurality of second tubes made of metal in
which a second fluid circulates; header tanks made of
metal communicating with both the tubes, the header tanks
being arranged at both longitudinal end sides of both the
25 tubes; and two pieces of separators made of metal for
dividing a space in the header tank into a first space
communicating with the first tubes and a second space
communicating with the second tubes, the two pieces of
separators composing a third space between the first
30 space and the second space; wherein the two pieces of
separators are joined by brazing to the header tank under
the condition that the two pieces of separators are
inserted from the slit hole formed in the header tank
35 into the header tank, and a hole for communicating the
third space with the outside of the header tank is formed
in the third space corresponding portion corresponding to
the third space in the head tank,

the method of manufacturing the heat

exchanger comprising the steps of: coating flux on the separator after the separator has been inserted into the header tank; and then brazing the separator and the header tank to each other.

5 11. A method of manufacturing a heat exchanger according to claim 10, further comprising the step of inspecting and repairing a brazed portion of the separator and the header tank after the separator and the header tank have been brazed to each other.